REMARKS

In the Office Action dated March 12, 2007, the Examiner stated claims 1, 11 and 24 are confusing and ambiguous because the Examiner stated the Applicants have claimed in those independent claims that reception of the acoustic signal at an auditory canal of the test object occurs without any hearing aid device, thereby obtaining a second received signal, and the Examiner stated this does not correspond with the figures in which the microphones are, according to the Examiner, a part of the hearing aid.

Applicants respectfully submit this confusion on the part of the Examiner arises from a misunderstanding of the specification as originally filed, which is clear and unambiguous on this point.

As explained in the introductory portion of the present specification, the natural sound entrance into the human ear is the auditory canal. ITE (in the ear) hearing devices, therefore, have the advantage relative to other types of hearing devices that the sound reception (admission) into the ITE hearing device ensues in the auditory canal, or at least at the auditory canal opening, because the ITE hearing aid itself is located in the auditory canal, and therefore the microphones in the housing of the ITE hearing aid are also located in the auditory canal.

Other types of hearing aid devices, however, although having an auditory feed, usually through a tube terminating in an auditory canal fitting, are not worn in the auditory canal itself, and therefore the microphone system of such other types of hearing aids is not located in the auditory canal. An example of such a hearing aid device is a BTE (behind the ear) hearing device. The housing of the BTE hearing device, which contains the microphone system thereof, is worn behind the external

portion of the ear, known by both the terms "auricle" and "pinna." Not only does this placement cause the microphone system of a BTE hearing aid to be located a non-natural position (i.e., outside of the auditory canal), but also the influence of the pinna on the incoming audio signal is lost, because, due to the location of the microphone system of a BTE hearing aid behind the pinna, the incoming audio signals reach the microphone system before the pinna has influenced those incoming audio signals.

The pinna normally serves the function of funneling incoming audio signals into the auditory canal. The pinna has its own acoustic transfer function that exerts an influence on such incoming audio signals. In other words, such incoming audio signals would be perceived differently if the pinnas were not present. Because of the absence of the influence of the pinna on the incoming audio signal received by a BTE hearing aid, a hearing-impaired person wearing a BTE hearing aid considers the signal that is provided by such a hearing aid (even after processing to correct the person's hearing impairment) to be somewhat non-natural, due to the absence of the influence of the pinna on the incoming audio signal.

Therefore, in accordance with the present invention, a hearing aid of the type that, when worn, is configured so that the microphone system thereof will not be located in the auditory canal, is adjusted to restore the influence of the pinna on the audio output signal of the hearing aid that is actually supplied to the hearing-impaired person, namely the signal that is actually introduced into the auditory canal of the hearing-impaired person by the hearing aid. In order to achieve this adjustment, a test arrangement is used, as is shown in Figure 1 of the present application, wherein a signal from a signal source is received both a microphone (the microphone MIC1)

that is located outside of the auditory canal, and another microphone (the microphone MIC2) that is located at or in the auditory canal. By determining the difference in signals between the outputs of MIC1 and MIC2, the influence of the external ear on the signal from the signal source can be determined. As explained in the specification, the testing can be undertaken using an artificial head or using an actual person, such as the person who will wear the hearing aid that is being adjusted in this manner. For this purpose, it is not necessary, and not desirable, for the actual hearing aid itself to be located in the ear, i.e., in the auditory canal, because the only result that is being tested is the difference between the signals received at MIC1 and MIC2, respectively. For this purpose, it is not necessary that, if a person is used as the test object, the person actually hear or perceive any signal. The testing is being undertaken simply to determine the physical audio transfer function of the pinna.

This is why the original claims referred to the adjustment taking place without a hearing in the auditory canal. From the other language in those claims, it is clear that, in order for this adjustment to have any utility, the hearing aid itself must not be involved. Therefore, this language has been cancelled from each of independent claims 1, 11 and 24, but Applicants submit that its presence in the original claims did not introduce any ambiguity into those claims and, for the reasons discussed above, the non-involvement of the hearing aid itself in the aforementioned testing is necessarily inherent in those claims.

In stating that original independent claims 1, 11 and 24 were confusing and ambiguous, the Examiner apparently believed that the microphones used for testing are a part of the hearing aid. As the above explanation makes clear, this is not the

case, and this is clearly indicated in the drawings and in the written portion of the specification. In the test arrangement shown in Figure 1, the microphones that are used are, as noted above, designed MIC1 and MIC2. The actual microphones that are in the hearing aid are indicated in Figure 3 (at their schematic location when the hearing aid is worn) as M1, M2 and M3, and are shown to be inside the hearing aid device itself in the circuit diagram of Figure 5.

The above discussion is also relevant to the rejection of claims 1-9, 11-19, 24-26 and 31-33 under 35 U.S.C. §103(a) as being unpatentable over Arndt et al. and Killon, and the rejection of claims 7, 10, 20-23, 27-30, 34 and 35 under 35 U.S.C. §103(a) as being unpatentable over Arndt et al. and Killon, further in view of Hohn. These rejections are respectfully traversed for the above reasons, together with the following additional explanations.

The Arndt et al. reference is concerned with setting (adjusting) a directional microphone system. The Arndt et al. method and arrangement are based on the desire of many hearing aid users to have the directional microphone system adjusted so that the audio output signals from the hearing aid are perceived by the hearing aid user as representing sound that is arriving from a particular direction, such as the forward viewing direction of the hearing aid user. The Arndt et al. method and arrangement are based on the recognition that if the hearing aid is "theoretically" set to try to achieve this result when the hearing aid is not being worn by the user, the actual perception on the part of the hearing aid user as to the direction of the incoming audio signal will be different (i.e., it will not be the desired direction) when the hearing aid is actually worn by the user.

For this purpose, Arndt et al., based on experimental results, make the aforementioned adjustment taking into account the physical acoustic effect of the head of the hearing aid user. In the Arndt et al. method and arrangement, therefore, the head of the hearing aid user is considered as a disturbing factor, whose influence must be taken into account in order to set the directionality of the directional microphone system to the desired direction. In other words, the Arndt et al. method and arrangement "force" the directional microphone system to be set to achieve a predetermined, desired result, such as the result of the user perceiving the incoming audio signal to be originating from the forward viewing direction of the user.

By contrast, in the method and hearing aid disclosed and claimed in the present application, as described above, the goal is to achieve a more natural hearing perception on the part of a person wearing a hearing aid that does not have a microphone system that is located in the auditory canal. There is no intent or desire to "force" the incoming audio signal to be perceived as originating from any particular direction, and in fact the opposite is the case, since the method and hearing aid disclosed and claimed in the present application seek to make the incoming signal more natural by including the influence of the external ear on the incoming audio signal.

In other words, the Arndt et al. method and apparatus are for the purpose of forcing the hearing aid to produce a (possibly) non-natural output that coincides with the preferential desires of the hearing aid user, whereas the method and hearing aid disclosed and claimed in the present application strives to make the hearing perception on the part of the hearing aid user as non-artificial as possible, by including the effect of the external ear on the incoming audio signal.

As the Examiner has noted, the Arndt et al. reference does not disclose that the microphone system of the hearing aid is located outside of the auditory canals of the person, however, as noted above, if this situation does not exist, the problem to which the inventive method and hearing aid are directed does not occur. Therefore, there is no need to modify an ITE hearing aid in accordance with the present invention, because the aforementioned problem of the effect of the external ear on the incoming audio signal being absent does not exist in such an ITE hearing aid. Even if the Examiner considers the Arndt et al. system to be non-specific as to the location of the microphone system, it is clear that even if the Arndt et al. method were applied to a hearing aid wherein the microphone system were not located in the auditory canal, the Arndt et al. system would still be used and would still operate as described above, namely to "force" the audio signal perceived by the hearing aid user, regardless of where the microphone system is located, to originate from a location that is predetermined by the user as being preferred.

The Examiner relied on the Killon reference as disclosing a hearing aid that is disposed outside of the auditory canals of the user, and of course Applicants do not dispute that this is the case. The Killon reference, however, simply describes various techniques for setting or adjusting the directional responses of such a hearing aid, and makes no mention whatsoever of the aforementioned problem of the effect of the external ear on the incoming audio signal being absent in the case of a hearing aid of the type disclosed in Killon, wherein the microphone system is not located in the auditory canal.

For the above reasons, therefore, Applicants not only submit that there is no basis for a person of ordinary skill in the field of hearing aid design to modify the

Arndt et al. reference, for any reason, in order to achieve a method or a hearing aid as claimed in the present application, but also even if such a modification based on Killon were actually undertaken (for reasons unknown to the present Applicants), the method and hearing aid of independent claims 1, 11 and 24 still would not result.

Therefore, none of claims 1-9, 11-19, 24-26 nor 31-33 would have been obvious to a person of ordinary skill in the field of hearing aid design under the provisions of 35 U.S.C. §103(a) based on the teachings of Arndt et al. and Killon.

For the same reasons, even if the Examiner's statements regarding the Hohn reference are correct, modifying the Arndt et al./Killon combination further in view of those teachings of Hohn still would not result in the subject matter of any of claims 7, 10, 20-23, 27-30, 34 or 35.

All claims of the application are therefore submitted to be in condition for allowance, and early reconsideration of the application is respectfully requested.

The Commissioner is hereby authorized to charge any additional fees which may be required, or to credit any overpayment to account No. 501519.

Submitted by,

Steven H. Noll (Reg. 28,982)

SCHIFF, HARDIN LLP
CUSTOMER NO. 26574
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606
Telephone: 312/258-5790
Attorneys for Applicants.

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